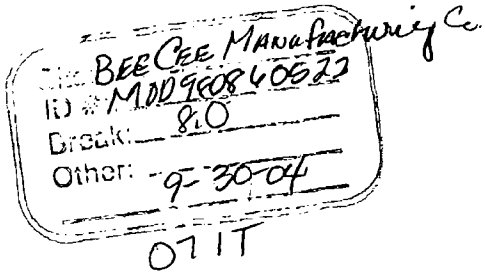
Five-year Review Report

First Five-year Review Report
for the
Bee Cee Site
Malden County, Missouri



September 2004

PREPARED BY:

Missouri Department of Natural Resources
Hazardous Waste Program
Jefferson City, Missouri

Approved by:

Edward Galbraith
Director
Hazardous Waste Program

Date: 9/29/04

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

REGION VII
901 NORTH 5TH STREET
KANSAS CITY, KANSAS 66101

30 SEP 2004

MEMORANDUM

SUBJECT: Bee Cee Manufacturing, EPA ID 071T
First Five-Year Review Report

FROM: Steven E. Kinser, Remedial Project Manager
Missouri/Kansas Remedial Branch

THRU: Steve Kovac, Chief
Missouri/Kansas Remedial Branch

TO: Cecilia Tapia, Director
Superfund Division

The state of Missouri Department of Natural Resources (MDNR) is the lead agency and the U.S. Environmental Protection Agency (EPA) is the support agency. The attached Five-Year Review report, dated 9-29-2004, was prepared by MDNR in consultation with EPA, Region 7. This is the first five-year review for the site.

The First Five-Year Review Report concludes that the remedy at the Bee Cee Manufacturing site currently is protective of human health and the environment.

The EPA, Region 7, concurs with the above conclusions and recommendations.

Attachment

Cecilia Tapia, Director
Superfund Division
U.S. EPA, Region 7

9/30/04
Date

RECYCLE
PAPER CONTAINS RECYCLED FIBERS

Table of Contents

Tables

Figure

Attachments

List of Acronyms

AOC	Administrative Order on Consent
Agencies	Missouri Department of Natural Resources & Environmental Protection Agency combined
ARARs	Applicable or Relevant and Appropriate Requirements
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	Code of Federal Regulations
Department	Missouri Department of Natural Resources
EPA	United States Environmental Protection Agency
FIG	Future Investigation of Groundwater
GSRAD	Geologic Survey and Resource Assessment Division
MNA	Monitored Natural Attenuation
NCP	National Contingency Plan
NPL	National Priorities List
O&M	Operation and Maintenance
PCOR	Preliminary Close Out Report
RA	Remedial Action
RAO	Remedial Action Objective
RCRA	Resource Conservation and Recovery Act
RD/RA	Remedial Design/Remedial Action
RI/FS	Remedial Investigation/Feasibility Study
ROD	Record of Decision
SOW	Statement of Work

Executive Summary

The Missouri Department of Natural Resources as the lead agency for the site has performed the first five-year review for the Bee Cee Manufacturing Superfund Site, located in Malden, Missouri (Fig 1). The five-year review is required as a matter of policy because hazardous substances, pollutants, or contaminants remain at the site for a period of time above levels that allow for unlimited use and unrestricted exposure. This review was initiated in October of 2003 and completed in August of 2004. The former Bee Cee Manufacturing facility operated from 1964 until early 1983 and produced aluminum moldings for storm windows and doors. Waste liquid from the process was allowed to flow through a series of pipes directly onto the surface soil outside of the facility.

The U.S. Environmental Protection Agency (USEPA) conducted response actions at the site in 1992 under an administrative order on consent (AOC). Response work at the site was divided into two actions. Samples of groundwater, soil, and air from the site were collected and analyzed. In addition, sediment samples from the ditch north of the site were collected. The potential source area for chromium contamination was found to be the soil outside of the facility where chemical-process liquids were disposed. A visibly stained surface area next to the building that contained the process vats was considered the contamination zone. The USEPA approved an Action Memorandum on July 1, 1992. The scope of the removal included contaminated soil and the portion of the Bee Cee Manufacturing building that contained five vats used for metal plating processes. The action level for the soil was set at 2000 parts per million (ppm) or milligrams per kilogram (mg/kg) for total chromium and 180 ppm for hexavalent chromium. Field activities for the removal were conducted from July 27 through August 20,1992. Contaminated soil and process tanks and portions of the building were removed.

The USEPA listed the site on the National Priorities List (NPL) in 1991. Sverdrup Environmental, on behalf of the department, conducted the Remedial Investigation (RI). Parts of this investigation occurred concurrently with the USEPA Removal Action. Later, Sverdrup Environmental conducted a Further Investigation of Groundwater (FIG). Both investigations were conducted to better define the contamination of the site. Field activities for the RI were conducted from April 13 through 24, 1992, and June 8 through June 12, 1992. Field activities for the FIG were conducted from April 12 through April 17, 1993.

Based on conclusions and recommendations contained in the RI, FIG and Risk Assessment, the Department ordered a Feasibility Study (FS). The Department completed the FS in October 1994. Information from the FS was used to select the most appropriate remedy for the remediation of the contaminated groundwater at the Bee Cee Site. The USEPA selected the remedy and detailed it in the Proposed Plan. The USEPA completed and released the Proposed Plan for public comment in April 1997. The contaminant plume is estimated to be 400 ft. long by 400 ft. wide, with a maximum depth of 25 ft. The plume is estimated to have traveled 438 ft. from the point of release. Analytical results of groundwater samples from the site, collected by the USEPA and the department, indicated the on-site presence of total chromium at levels above current water quality standards. Hexavalent chromium has been detected at levels that do not

Executive Summary, continued

exceed current water quality standards; however, these concentrations are in excess of the risk-based level calculated by the Missouri Department of Health (MDOH).

The response action selected in the Record of Decision (ROD) addressed the contamination at the site not addressed during the prior removal action. This response action involved construction of the five additional groundwater monitoring wells and monitoring the groundwater annually from the ten wells for monitored natural attenuation (MNA) for the first ten years, or until the cleanup levels for groundwater specified for total chromium and hexavalent chromium have been attained, whichever is earlier. The site remediation goal selected for hexavalent chromium was 18 parts per billion (ppb) and for total chromium was 100 ppb. The remedy also involved enacting institutional controls to restrict access to contaminated groundwater at the site. By placing the site on the State's Hazardous Waste Registry the department's ability to control the installation of drinking water wells in the contaminant plume is effective. The department has determined that by being on the registry no additional institutional controls are required to make the site protective.

The department's Environmental Services Program started groundwater monitoring of the ten wells in 1999. A map showing the locations of the wells can be found in Attachment 1 and Figure 1. The hexavalent chromium and total chromium plume has not migrated to any of the additional five monitoring wells (MW) installed as part of the remedial action. The hexavalent chromium and total chromium levels have generally decreased overall which would indicate that MNA is working. Total chromium results have decreased to below the site remediation goal of 100 ppb for the past three years. Hexavalent chromium results have not consistently stayed below the site remediation goal of 18 ppb. Therefore, the groundwater at the site will continue to be monitored annually. Annual monitoring results of affected wells are located in Table 2.

As part of the current five-year review, an inspection of the site was conducted on June 9, 2004 by the department. All remedial actions at the site were observed to be in place and functioning effectively. The wells were in good condition and functional. The remedy at the Bee Cee Manufacturing site is protective of human health and the environment.

Five-year Review Summary Form

SITE IDENTIFICATION		
Site name Bee Cee Manufacturing Site		
EPA ID *(from WasteLAN)*: MO D980860522		
Region: VII	**State: MO**	**City/County: Malden, Dunklin**

SITE STATUS	
NPL status: Final	
Remediation status: in 5th yr of the remedial action	
Multiple OUs? No	**Construction completion date: 9-10-1999**
Has site been put into reuse? YES	

REVIEW STATUS	
Lead agency: State	
Author name: Pia Capell	
Author title: Project Manager	**Author affiliation: Missouri Department of Natural Resources**
Review period: 10/01/2003 to 08/20/2004	
Date(s) of site inspection: 09/08/1999 & 06/09/2004	
Type of review: **XX Policy Review**	
Review number: First	
XX Actual RA start at OU1	
Triggering action date *(from WasteLAN)*: 8/27/1999	
Due date *(five years after triggering action date)*: 9/10/2004	

*** [Review period should correspond to the actual start and end dates of the Five-year review in WasteLAN.]**

Five-year Review Summary Form, continued

Issue:

The purpose of this report was to evaluate the effectiveness of monitored natural attenuation of chromium and hexavalent chromium in the groundwater at the site. This selected remedy involved the construction of the five monitoring wells in addition to five existing monitoring wells; annual monitoring of the groundwater from these ten monitoring wells for a period of ten years, or until the cleanup levels for groundwater specified in the ROD and Statement of Work have been attained, whichever is earlier; and enacting institutional controls to restrict access to contaminated groundwater at the site.

Recommendations and Follow-up Actions:

Continue with the monitoring until the next five-year review. The next five-year review period will produce data upon which to verify if the remedy remains protective.

Protectiveness Statement(s):

All immediate threats at the site have been addressed and the remedy is protective of human health and the environment. The department is monitoring the plume. The groundwater is currently being treated through monitored natural attenuation. The USEPA removed soil contamination to prevent future contamination of the groundwater. Institutional controls are in place to assure that no new drinking water wells are installed in the plume.

Long Term Protectiveness:

The remedies specified for the site are protective of human health and the environment. The remedy at the site will continue to operate until the next five-year review process. If the groundwater in the monitoring wells does not meet the cleanup levels set in the ROD, the remedy may need to be reevaluated. The effectiveness of the remedial activities will be evaluated during the next five-year review period.

Other Comments: None

Bee Cee Manufacturing Site
Bee Cee Manufacturing
Five-year Review Report

I. Introduction

The purpose of a five-year review is to determine whether the remedy at a site is protective of human health and the environment. The methods, findings, and conclusions of reviews are documented in Five-year Review Reports. In addition, Five-year Review Reports identify issues found during the review, if any and recommendations to address them.

The Missouri Department of Natural Resources is preparing this Five-year Review on behalf of the U.S. Environmental Protection Agency (USEPA), pursuant to the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) §121 and the National Contingency Plan (NCP). CERCLA §121 states:

> *If the President selects a remedial action that results in any hazardous substances, pollutants, or contaminants remaining at the site, the President shall review such remedial action no less often than each five years after the initiation of such remedial action to assure that human health and the environment are being protected by the remedial action being implemented. In addition, if upon such review it is the judgment of the President that action is appropriate at such site in accordance with section [104] or [106], the President shall take or require such action. The President shall report to the Congress a list of facilities for which such review is required, the results of all such reviews, and any actions taken as a result of such reviews.*

The department interpreted this requirement further in the NCP; 40 CFR §300.430(f)(4)(ii), which states:

> *If a remedial action is selected that results in hazardous substances, pollutants, or contaminants remaining at the site above levels that allow for unlimited use and unrestricted exposure, the lead agency shall review such action no less often than every five years after the initiation of the selected remedial action.*

The department conducted the five-year review of the remedial actions implemented at the Bee Cee Manufacturing Site, Malden, Missouri. This review was conducted by the project manager for the entire site from August 2003 through August 2004. This report documents the results of the review.

This is the first five-year review for the Bee Cee Manufacturing site. The five-year review is required as a matter of policy because hazardous substances, pollutants, or contaminants remain

at the site for a period of time above levels that allow for unlimited use and unrestricted exposure.

II. Site Chronology

Table 1: Chronology of Site Events	
Event	**Date**
General	
Site Discovery	**7/1982**
Final Listing on the National Priorities List (NPL)	**6/10/1986**
Bee Cee Manufacturing site was placed on the Registry of Confirmed Abandoned or Uncontrolled Hazardous Waste Sites.	**07-08-88**
Preliminary Removal Assessment	**2-12-1992**
Remedial Investigation completed	**06/01/93**
Removal of Contaminated Surface Soil	**8-20-1992**
Human Health Risk Assessment completed	
A Further Investigation of Groundwater (FIG) was conducted	**04/12-04/17/93**
Feasibility Study completed	**09/30/1997**
Record Of Decision (ROD) signed	**9/30/1997**
Remedial Design approved	**03/05/1999**
Cooperative Agreement signed	**8/31/99**
Remedial Action completed (construction of 5 monitoring wells)	**9/1-9/8/99**
Pre-final Inspection conducted by the state and USEPA	**9/8/99**
Preliminary Close-out Report signed by USEPA, construction complete.	**9/10/99**
First round of groundwater samples collected from all ten wells	**10/12/99**
Sample Monitoring Wells MW-1, MW-3, MW-5	**11/2000**
Sample Monitoring Wells MW-1, MW-3, MW-5	**11/2001**
Sample Monitoring Wells MW-1, MW-3, MW-5	**10/2003**
Sample Monitoring Wells MW-1, MW-3, MW-5	**3/2004**

III. Background

Physical Characteristics

The Bee Cee Manufacturing Site is located in the town of Malden, Dunklin County, Missouri. A map showing the location of the Site can be found in Figure 1. The site is located in the southeast Mississippi lowlands subdivision of the Gulf Coastal Plain Province. Most of Dunklin County is a nearly level part of the current Mississippi River Alluvial Plain. The town of Malden consists of primarily residential and commercial/industrial buildings with an approximate population of 4,698. The land within a quarter mile of the site is part of an industrial park. While most of it is vacant, some areas are used for small industrial plants and warehouse space. The nearest home is just over a quarter of a mile south of the site.

The contaminated soil, considered to be the source of the groundwater contamination, was addressed in a 1992 removal. The Removal Assessment addresses the groundwater plume.

The groundwater plume is estimated to be 400 ft. long by 400 ft. wide, with a maximum depth of 25 ft. The plume is estimated to have traveled 438 ft. from the point of release. From the last five rounds of annual sampling, the plume does not appear to have migrated past the monitoring well 5 (MW-5), which could be attributed to the natural attenuation process. The plume involves an industrial property.

Land and Resource Use

The land within a quarter mile of the site is part of an industrial park. While most of it is vacant, some areas are used for small industrial plants and warehouse space. The nearest home is just over a quarter of a mile south of the site. Malden's municipal water supply well No. 4 is located within one mile of the site. Water from the site is not likely to impact this well since it is side gradient from the site and is completed in an artesian aquifer about 800 feet below ground surface.

History of Contamination and Initial Responses

Bee Cee Manufacturing occupied the site from 1964 until early 1983 and produced aluminum moldings for storm windows and doors. The window and door moldings were cleaned and etched in preparation for application of a finishing coat of paint. A series of five open vats were used to hold cleaning, etching, and rinsing fluids. The aluminum moldings were dipped from one tank to another during the manufacturing process. The chemicals in the various vats were identified under the trade names Alodine 4780 and Ridoline 72.

Waste liquid from the process was allowed to flow through a series of pipes directly onto the surface soil immediately north of the east end of the facility. Personnel from the Water Pollution Control Unit of the department's Southeast Regional Office (SERO) reported chromium wastes on the surface at the site during an investigation conducted July 13, 1981. In a letter from the department dated July 27, 1981, Bee Cee Manufacturing was warned to cease the discharge of untreated process water.

Bee Cee Manufacturing declared bankruptcy in 1983 and the site was taken over by Missouri Aluminum Products Company. This company cut and assembled storm doors but did not include chemical cleaning of aluminum in the process as did Bee Cee Manufacturing.

Falcon Door and Window (Falcon) next occupied the site. Falcon only assembled aluminum door and window frames and did not generate any hazardous wastes from their process. According to a bill of sale dated April 15, 1985, Falcon Communications purchased certain assets from Missouri Aluminum Products Company. Falcon did not purchase the vats. However, Falcon arranged to have the material that remained in the tanks removed.

The contents of the five vats was sampled and analyzed by William A. Green and Associates (WAGA) of Malden, Missouri for pH, hexavalent, trivalent and total chromium, aluminum, nickel, and lead to determine compliance with discharge requirements to the local Publicly Owned Treatment Works (POTW). According to a Falcon letter to the department dated December 20, 1985, the Malden Board of Public Works authorized discharging the contents of vats one, two, four, and five to the POTW provided that the pH was adjusted to between six and nine prior to discharge.

The sludge in the four vats was removed by WAGA. However, the vats were left in place. WAGA recommended the chromic acid solution in vat three should be removed by a hazardous waste disposal company. Falcon Door and Window requested authorization from the department for removal of the waste material contained in the tank. According to a letter written by WAGA to Falcon on March 20, 1986, Mid-America Transport Services, a licensed hazardous waste transporter, removed and transported the chromic acid solution. According to the letter, the tank walls were rinsed; however, a small amount of aluminum solution and less than one gallon of rinse water remained on the tank bottom. The chromic acid solution was transported to Chem Clear, Incorporated, in Chicago, Illinois on March 20, 1986, as stated in a copy of the Uniform Hazardous Waste Manifest.

During the time that the building was occupied by the various tenants, several sampling events and evaluations of the groundwater (from nearby wells), soil, and "sludge" at the site were conducted. The department's Division of Environmental Quality Laboratory Services Program collected samples from the following four sources: (1) selected city wells, (2) liquid discharge from a pipe extending out of and onto the north side of the building (from the area of the building that contained the chemical cleaning process vats), (3) discolored soil north of the building, and (4) the five process vats. The Missouri Department of Health (MDOH) also collected water

samples at several nearby residential, irrigation, and public water supply wells from 1984 to 1991. Southeast Missouri State University conducted a test-pit survey at the site in 1986.

A report prepared by the department on June 27, 1984, indicated that the sludge north of the building was sampled and analyzed according to the Toxicity Extraction Procedure (TEP). The reported chromium concentration was 2.5 milligrams per liter (mg/l). According to the report, the regulatory TEP Limit for chromium was 5.0 mg/l. The discharge liquid from the building was also analyzed and found to have a chromium concentration of 0.62 mg/l. Several wells located near the site were also sampled; however, only three metals aluminum, barium, and lead, were detected at concentrations, above their associated detection limit.

Aluminum and chromium were each detected at concentrations above detection levels at a residential well (Dwayne Stark residence) with concentrations at 1.0 and 0.032 mg/l, respectively. Samples taken from the two wells at the nearby golf course had concentrations of barium above the detection level. A map showing the locations of these wells can be found in Figure 1.

Seven city wells were monitored from March 1984 to September 1991 by MDOH. The groundwater analytical data from samples taken from those wells indicated no concentrations of chromium above the detection limit of 0.005 mg/l.

The USEPA's Emergency Planning and Response Branch (EP&R) and Technical Assistance Team (TAT) conducted a preliminary removal assessment on February 12, 1992. The Bee Cee Manufacturing building interior and exterior were inspected for future removal procedures by representatives of TAT, EP&R, the department, a removal contractor, and Sverdrup Environmental Incorporated (SvE). The potential source area for chromium contamination was the soil north of the east end of the metal treating facility where chemical-process liquids were disposed. The soils in this area were sampled in April 1992 and were evaluated by the collection of 40 soil samples. The USEPA approved an Action Memorandum for the Removal of Contaminated Surface Soil at the Bee Cee Site on July 1, 1992. The action level for the soil was set at 2000 mg/kg for total chromium and 180 mg/kg for hexavalent chromium. The scope of the removal included contaminated soil and the portion of the Bee Cee Manufacturing building that contained five vats used for metal plating processes.

On July 27, 1992, the USEPA's on scene coordinator (OSC) and the site remediation contractor, Riedel Environmental Services (RES) mobilized to the site. Removal of the contaminated soil, process tanks, and portions of the building was completed on August 20, 1992

Following listing of the site on the NPL in 1991, a Remedial Investigation (RI) of the site was conducted by SvE on behalf of the department. Parts of this investigation occurred concurrently with the RI and Removal Action. Later, SvE conducted a FIG. Both investigations were conducted to better define the contamination of the site. TAT provided assistance for the RI. Field activities for the RI were conducted from April 13 through 24, and June 8 through

June 12, 1992. Field activities for the FIG were conducted from April 12 through April 17, 1993. Samples of groundwater, soil, and air from the site were collected and analyzed. In addition, sediment samples from the ditch north of the site were collected. The potential source area for chromium contamination was found to be the soil north of the east end of the facility where chemical-process liquids were disposed. A visibly stained surface area next to the building that contained the process vats was considered the contamination zone.

Based on conclusions and recommendations contained in the RI, FIG and Risk Assessment, the department ordered a Feasibility Study (FS). The department completed the writing of the FS in October 1994, however the ROD was not signed until September 9, 1997.

Information from the FS was used to select the most appropriate remedy for the remediation of the contaminated groundwater at the Bee Cee Site. This selection was detailed in the Proposed Plan by the USEPA, which was completed and released for public comment in April 1997.

Basis for Taking Action

The following is a list of the hazardous substances, which have been released at the site. Contamination, predominantly hexavalent chromium and chromium was detected in various media including the soil north of the east end of the metal treating facility where chemical-process liquids were disposed and various groundwater wells located throughout the site. The 1992 removal action by the USEPA took care of the soil contamination at the site.

Groundwater: Hexavalent chromium and chromium

Soil: Hexavalent chromium and chromium

IV. Remedial Actions

Remedy Selection

The ROD for the Remedial Action at the site was signed on September 9, 1997. The Department selected a Remedial Action to address the contaminated groundwater in the ROD. Even though the source has been removed, concentrations of hexavalent chromium in groundwater at the site (the primary contaminant of concern) exceed site-specific risk-based concentrations. However, use of the site can be controlled and there are no known shallow groundwater users down gradient of the site. Therefore, ongoing monitoring and prohibiting the use of the contaminated groundwater plume was deemed to be a sufficient remedy. The remedial action objectives for the ROD were identified as 1) Prevent ingestion of water containing hexavalent chromium in excess of the health risk-based preliminary remediation goals (PRGs) established for the site of 18 micrograms per liter (µg/L) and 2) hydraulically control and eliminate the groundwater contamination located onsite. Reducing the hexavalent chromium concentration in groundwater to below the PRG will return the groundwater at the site to its beneficial uses. The selected

remedy for the site is MNA and institutional controls. The major components of the remedy selected in the ROD include the following:

- construction of five additional groundwater monitoring wells;

- natural attenuation processes that act without human intervention to transform hexavalent chromium to the less toxic trivalent form. Trivalent chromium is less soluble and thus less mobile, than hexavalent chromium. Under alkaline to slightly acidic conditions, it precipitates as a fairly insoluble hydroxide;

- annual groundwater monitoring of the ten wells for the first ten years or until the site remediation goals for hexavalent chromium and total chromium have been attained, whichever is earlier, to demonstrate that: natural attenuation is occurring; the plume is not expanding; there are no significant impacts to down gradient receptors; and institutional controls are effective. If future site data indicate the need for a change in monitoring frequency or the addition of new monitoring wells, then such measures should be taken to ensure the achievement of the monitoring goals. Furthermore, monitoring should continue for a minimum of three years after the PRG for the site has been achieved to ensure that concentration levels are stable; and

- enacting institutional controls to restrict access to contaminated groundwater at the site. This will be implemented to ensure that no drinking water wells will be installed in the contaminated plume. In the event that groundwater monitoring reveals no significant decrease in hexavalent concentration after five years of monitoring and the plume appears to be expanding and threatening down gradient receptors, a contingency remedy will be implemented.

Remedy Implementation

Following the signing of the ROD, the USEPA approved the Remedial Design completed by the department. The USEPA requested that the site owner, the city of Malden, conduct the remedial work. The city declined, citing a lack of financial means. Therefore the site work was primarily federally funded and the department performed the remedial work as a state-lead site.

Institutional controls are in place through the use of the Missouri Registry, to prevent exposure to site contaminants. The site was placed on the Registry July 8, 1988, by the department. Since the source of the contamination has been removed, the only remaining exposure pathway is through exposure to the contaminated groundwater. Therefore, the institutional controls will ensure that no drinking water wells will be installed in the contaminated plume.

The Geologic Survey and Resource Assessment Division (GSRAD) prepared the work plan and specifications for the installation of the five additional monitoring wells for the remedial action.

The department and USEPA reviewed and approved these plans prior to the award of the Cooperative Agreement. The work was completed through a new State Superfund Contract that was signed by the USEPA and the department, August 31, 1999. A Quality Assurance Project Plans (QAPP) and an operation and maintenance (O&M) plan was completed by the department and approved by the USEPA August 1999.

GSRAD completed the construction of the five additional wells between September 1-8, 1999. A Pre-final Inspection was conducted by the department and USEPA on September 8, 1999. During the pre-final inspection, the department and the USEPA determined that the construction activities of the remedial action performed by department personnel were in accordance with the ROD, the statement of work (SOW), and all QAPPs for the site. A short list of items that needed to be addressed was noted.

After the Pre-Final Inspection, the department, with the concurrence of the USEPA determined that a Final Inspection was not necessary, since the basic construction activity had been completed at the time of the Pre-Final Inspection. No further response is anticipated at this site, aside from annual monitoring of the wells. The USEPA signed a Preliminary Closeout Report prepared by the department on September 10, 1999, and the construction completion was considered attained for this site.

Operation and Maintenance

The department's obligation to provide 100 percent funding for O&M will begin eleven years after completion of construction of the five additional monitoring wells or when the groundwater cleanup standards set forth in the SOW and ROD have been attained, whichever is earlier. The department shall have overall responsibility and decision making authority for the management of this site. It will control the O&M of the groundwater monitoring system. Tasks for managing the site will include coordinating annual sampling of the monitoring wells with the department's Environmental Service Program (ESP), evaluating data, providing opportunities for public involvement, and issuing decisions regarding the site. The state contribution costs for O&M to date are $2,860.35.

V. Progress Since the Last Review

This is the first five-year review for the site.

VI. Five-year Review Process

Administrative Components

The five-year review was conducted by Pia Capell of the department, a project manager. Steve Kinser of the USEPA assisted in the review as the representative for the support agency.

The review included the following components:

- Community Involvement
- Document Review
- Data Review
- Site Inspection, and
- Five-year Review Report Development and Review

The review schedule extended through August 2004.

Community Involvement

A public comment notice was printed in the Malden newspaper on May 5, 2004, stating that the five-year review was taking place. After the five-year review is completed, a copy of the report will be made available in the site's administrative record.

Document Review

This five-year review consisted of a review of relevant documents including the early decision documents, available monitoring data and the Five-year Review site inspection report. Applicable groundwater cleanup standards as listed in the 1997 ROD were reviewed.

Data Review

The state project manager reviewed annual groundwater monitoring well sampling data from the past five sampling events which took place in October 1999, November 2000, November 2001, October 2003, and March 2004. Groundwater data for MW-1, MW-3 and MW-5 is listed in Table 2.

Site Inspection

The state and EPA project managers conducted an inspection on September 8, 1999. The department staff conducted an inspection on June 9, 2004. The first site inspection was completed to attain the construction completion for the remedial action and the second one was completed for the five-year review process. The June 9, 2004, site inspection report is attached. During the June 9, 2004, site inspection land use on and surrounding the site was observed, the wells were located and observed, and general site conditions were observed by the southeast regional office hazardous waste inspector. The following was noted in the inspection relating to the current status of the site:

A. There was an open field to the north and south, concrete plant to the east, and manufacturing facility to the west. The vegetation was mowed and well established.

B. The monitoring wells were in good condition and functional.

C. There was no sign of recreational use at the site or any sign of vandalism to the wells or the site. The site is part of the Malden Industrial Park area but the site remains vacant.

Site Interviews

None.

VII. Technical Assessment

Question A: Is the remedy functioning as intended by the decision documents?

The GSRAD prepared the work plan and specifications for the installation of the five additional monitoring wells as part of the remedy. In June 1996 the five additional wells were installed by GSRAD in accordance with the Missouri Well Construction Rules. ESP conducted sampling activities related to monitored natural attenuation in accordance with a site-specific QAPP, which follows all state and USEPA quality assurance and quality control procedures and protocol. The QAPP for the project is approved.

The department placed the site on the Registry in July 8, 1988. Since the source of the contamination has been removed, the only remaining exposure pathway is through exposure to the contaminated groundwater. Institutional controls are designed to ensure that no drinking water wells will be installed in the contaminated plume. The institutional controls recommended in the remedy are in place through the use of the Missouri Registry, to prevent exposure to site contaminants.

Overall the concentrations of the hexavalent chromium and total chromium appear to be decreasing site-wide although there has been significant fluctuations from year to year. Annual monitoring results of affected wells are located in Table 2. Concentrations for total chromium have been below the site remediation goal of 100 ppb for three consecutive years in all wells including MWs 1,3, and 5, which had previously high total chromium levels. The hexavalent chromium levels have been non detect in MW-1 for six consecutive years. Hexavalent chromium levels in MW 3 and 5 continue to be elevated though decreasing. Hexavalent chromium levels in MW 5 have been below the site remediation goal of 18 ppb for two of the past three years, however it is too early to tell whether they will remain below the site remediation goal. Wells downgradient from MWs 3 and 5 continue to show no detects. For this reason we conclude that MNA is occurring as predicted and the remedy is functioning as intended by the decision document.

Question B: Are the exposure assumptions, toxicity data, cleanup levels, and remedial action objectives (RAOs) established at the time of remedy selection still valid?

There have been no changes in the physical conditions of the site that would affect the protectiveness of the remedies.

Question C: Has any other information come to light that could call into question the protectiveness of the remedy?

There is no other information that calls into question the protectiveness of the remedy. There are no newly identified ecological risks and there are no impacts from natural disasters.

Technical Assessment Summary

The remedy is operating as specified in the ROD. The next five-year review period will produce data to verify the continued protectiveness of the system. At this time, it appears that the selected remedy of monitored natural attenuation is protective.

VII. Issues

There are no issues related to current site operations, conditions, or activities that prevent the remedy from being fully protective.

IX. Recommendations and Follow-up Actions

The only follow-up action is to continue to monitor the ground water annually until the next five-year review. The department is responsible for implementing the actions and is the lead oversight in consultation with USEPA.

X. Protectiveness Statement(s)

The remedy for the site was implemented in August 1999. The remedy for the site is expected to be protective of human health and the environment.

Long-term protectiveness of the remedial action will be verified by continuing to monitor the groundwater on an annual basis until the next five-year review.

XI. Next Review

The next five-year review for the Bee Cee Manufacturing Site is required by September 2009, five years from the date of this review.

Table

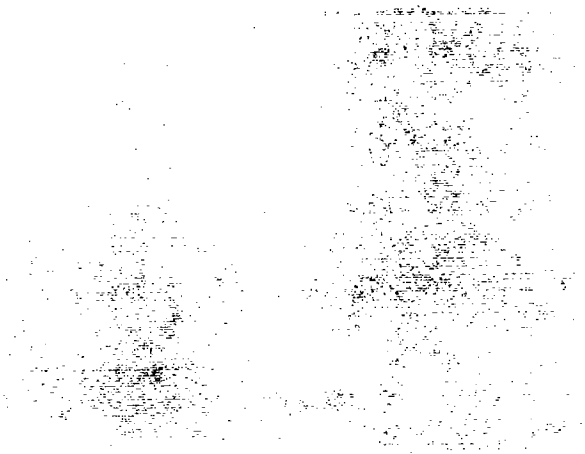


TABLE 2

Bee Cee Manufacturing Site
Annual Monitoring Well Sampling Results

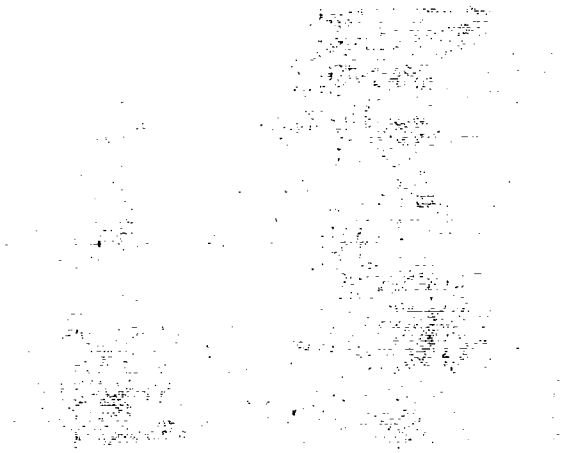
Selected Well Results

	MW-1		MW-3		MW-5	
	Hex	**Total**	**Hex**	**Total**	**Hex**	**Total**
RI 92	<50	24.1	135	140	<50	3
FIG 93	--	40.7	100	112	--	<3
AM 94	<10	<25	60	73.4	<10	<25
AM 95	<10	88.4	98	126	<10	5.95
AM 96	ND	56.1	70	103	ND	ND
AM 97	1	54.9	46	124	ND	ND
AM 98	ND	41.9	72	110	1	7.47
AM 99	ND	ND	39	89.9	28	59.1
AM 00	ND	129	34	267	26	486
AM 01	ND	ND	13	15.7	12	12.2
AM 03	ND	ND	40	42.4	30	27.7
AM 04	ND	ND	40	41.2	10	15.1

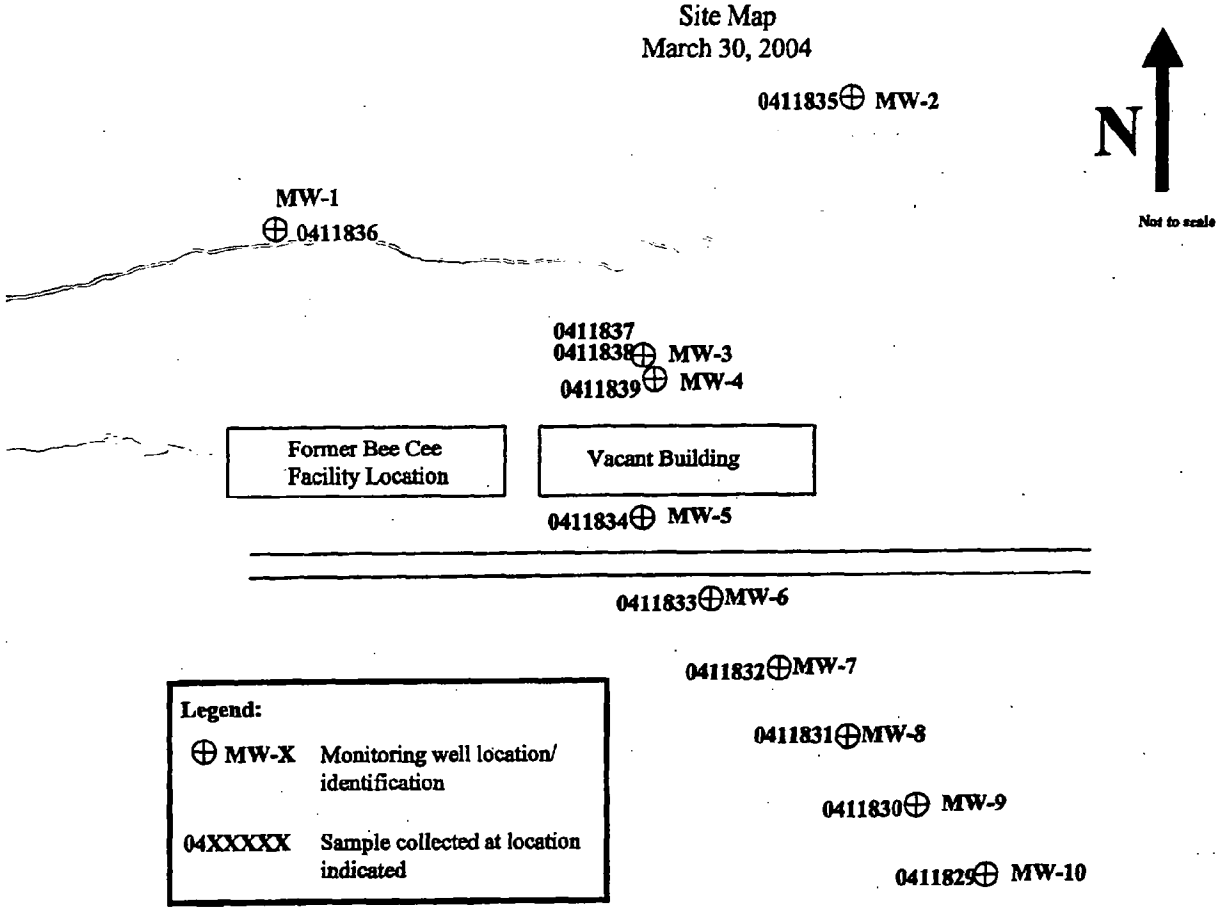
*** all values listed in parts per billion (ug/l)**

(1) **RI = Remedial Investigation**
(2) **FIG = Further Investigation of Groundwater**
(3) **AM = Annual Monitoring**
(4) **Hex = Hexavalent chromium**
(5) **Total = Total chromium**
(6) **ND = Non detect**

Attachments



Attachment 1
Bee Cee Manufacturing
Site Map
March 30, 2004



Attachment 2
List of Documents Reviewed

The following documents were reviewed in completing the five-year review:

- ✓ **Record of Decision (ROD) including all attachments.**
- ✓ **Remedial Action (RA) construction documents.**
- ✓ **Remedial Action (RA) Operation and Maintenance (O & M) Plan.**
- ✓ **100% Remedial Design (RD) Document Package.**
- ✓ **Annual Groundwater Monitoring Well Results.**
- ✓ **Annual Groundwater Monitoring Well Sampling Event Reports.**
- ✓ **Five Year Review Inspection Report.**

Attachment 3
Comments received from Support Agencies and/or the Community

No comments were received from the community and comments from the USEPA have been incorporated into this Five-year Review document.

Figure

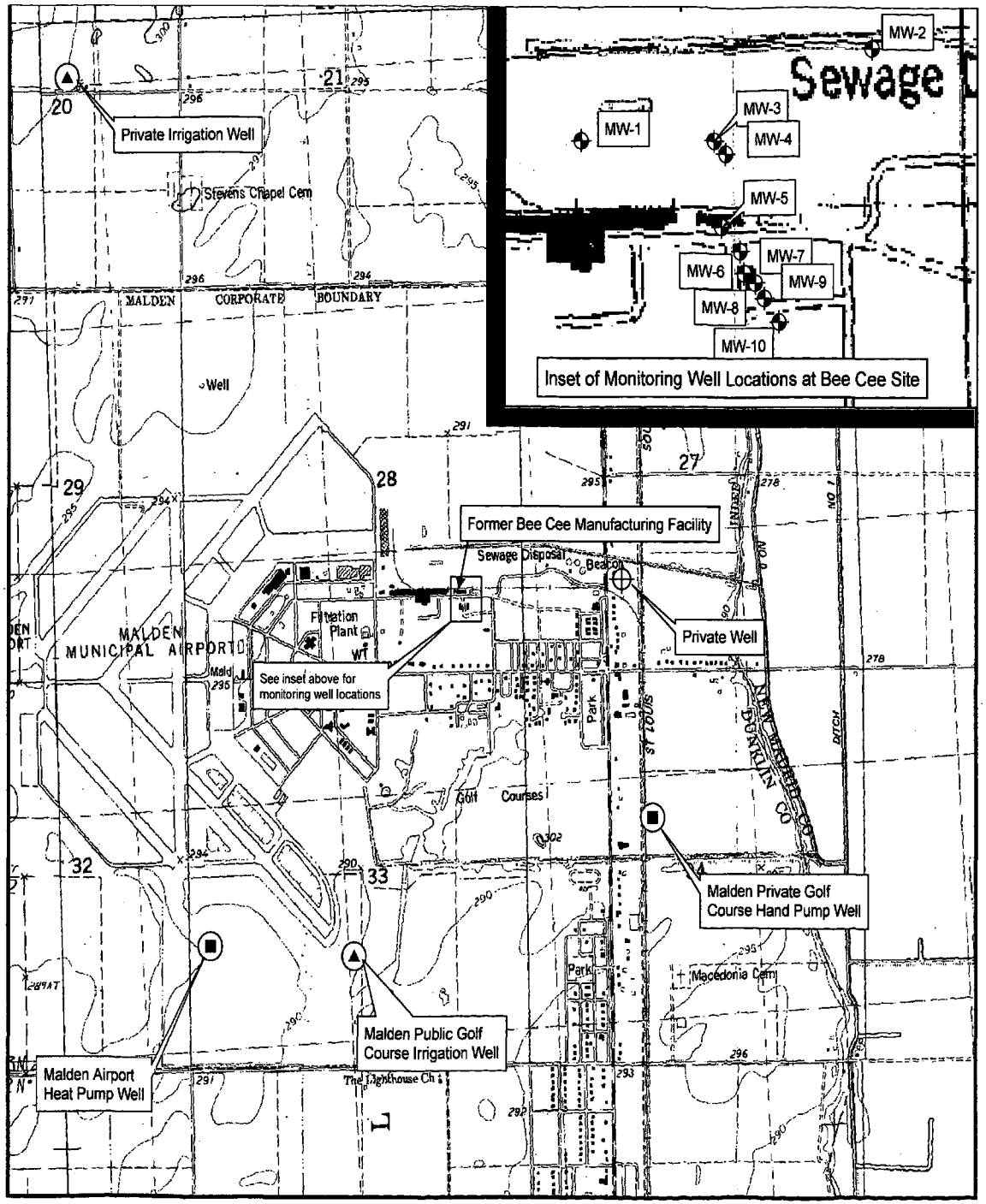


Figure 1
Site Location/Sampling Map
Bee Cee Manufacturing Site
Harper Drive, Malden Industrial Park
Malden, Dunklin County, MO 63863

LEGEND

- Monitoring Well
- Private Well
- Agricultural Well
- Industrial Well

The private, agricultural and industrial wells surrounding the Bee Cee Manufacturing Site were sampled by Sverdrup during the Further Investigation of Groundwater Report in 1993. Well locations are approximate and not based on GPS data.

Created on: September 7, 2004

Base Map: USGS Topgraphic Map, 7.5 Minute Series Malden, Valley Ridge and Powe Missouri Quadrangles.

Although all data sets used to create this map have been compiled by the Missouri Department of Natura Resources, no warranty, expressed or implied, is ma by the department as to the accuracy of the data and related materials. The act of distribution shall not constitute any such warranty, and no responsibility i assumed by the department in the use of these data or related materials.

Missouri Department of Natural Resources
Air and Land Protection Division
Hazardous Waste Program